TRADITIONAL TARO CULTIVATION IN THE SOLOMON ISLANDS

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Introduction

The Solomons consist of scattered islands extending approximately 900 miles in a southeasterly direction from Bougainville in the country of Papua New Guinea to the Santa Cruz Islands as shown in the map (Fig. 1). The six major islands of Choiseul, New Georgia, Santa Isabel, Malaita, Guadalcanal, and San Cristobal, about 500 miles distant, form a double chain from Bougainville meeting again at San Cristobal. Typically, the large islands are 20 to 30 miles in width and have a mountainous spine which on one side drops down steeply to the sea level and on the other through a series of foothills to the coast. Guadalcanal has the only extensive coastal plain. Except for the coral atolls and the raised coral reefs, the cores of most islands are igneous and metamorphic rock overlaid with marine sediments. To the northeast, Ontong Java, a characteristic atoll, together with the raised coral atolls of Rennel and Bellona to the south and the islands of Tikopia and Anuta in the east, are the homes of the Polynesian communities.

The climate is equatorial, but this is modified by the surrounding ocean, the major islands being high enough to produce a cool night breeze which may bring the temperature down as low as 19°C. Rainfall is often heavy, especially in the inland areas of larger islands. Areas sheltered from the prevailing winds are usually drier than other parts. Annual rainfall may be as high as 300 inches, but generally the average is between 120 and 140 inches.

Most parts of the country are covered with dense forest, but on Guadalcanal there are extensive tracts of rough grass on the northern side where the soil is generally good. In some areas, the coastal plains are swampy.

The people of the Solomon Islands are of three different racial groups, namely, Melanesian, Polynesian, and Micronesian. The Melanesians form the largest group and occupy the larger islands of the country. Every man and woman is a gardener or farmer, and for this reason the future of Solomon Islands seems to lie in the development of agriculture and its limited natural resources. However, the development of new cash crops for the world market as well as their own food will require a variety of production systems to ensure food security and sustainability. Modern agronomic techniques using superior varieties would benefit the majority or the islands.

In their traditional way of life, the people of the Solomon Islands lived with their kindred in small villages on their tribal land, practicing shifting subsistence agriculture and semi-permanent cropping systems, fishing, hunting, and raising pigs, and above all keeping very much to themselves, apart from the occasional raids from and on their neighboring villages and islands. Rule was by custom norms, as clarified by the chief and the village elders, although on some islands chiefly lines or extended families exercised a wider authority and responsibility based on their reputation achieved through success, influence, and wealth. Contact with the outside world has put a stop to the raids and has brought in many changes, good and bad, but basically the mode of living for the majority is still the traditional life in the villages. Every family grows its own food and builds its own house.

Root Crops in the Solomon Islands

For food, all three races depend very much on root crops for their daily subsistence. Occasionally, when there is money available, they may buy rice and other imported food, but this is a luxury very few can afford. Root crops still form the major part of the people's diet and will continue to do so for many more years to come.

Taro (*Colocasia esculenta*), yams (*Dioscorea spp.*), sweet potato (*Ipomea babatas*), and Cassava (*Manihot esculenta*) are the four major root crops grown throughout the islands and are components of the daily diet. Taro and yam used to be the major root crops grown throughout the islands and are very much a part of the people's customs. Sweet potato, a late comer to the country, is now the main crop grown, and cassava is also on the increase. Taro and yams with pigs and bananas (*Musaceae* spp.) are the most important components of all traditional feasts in the Melanesian and Polynesian communities in the Solomon Islands. The root crops such as taro and yam are also symbols of how wealthy or well off a family or tribe is by traditional standards and ensure their acceptance in the communities in which they live.

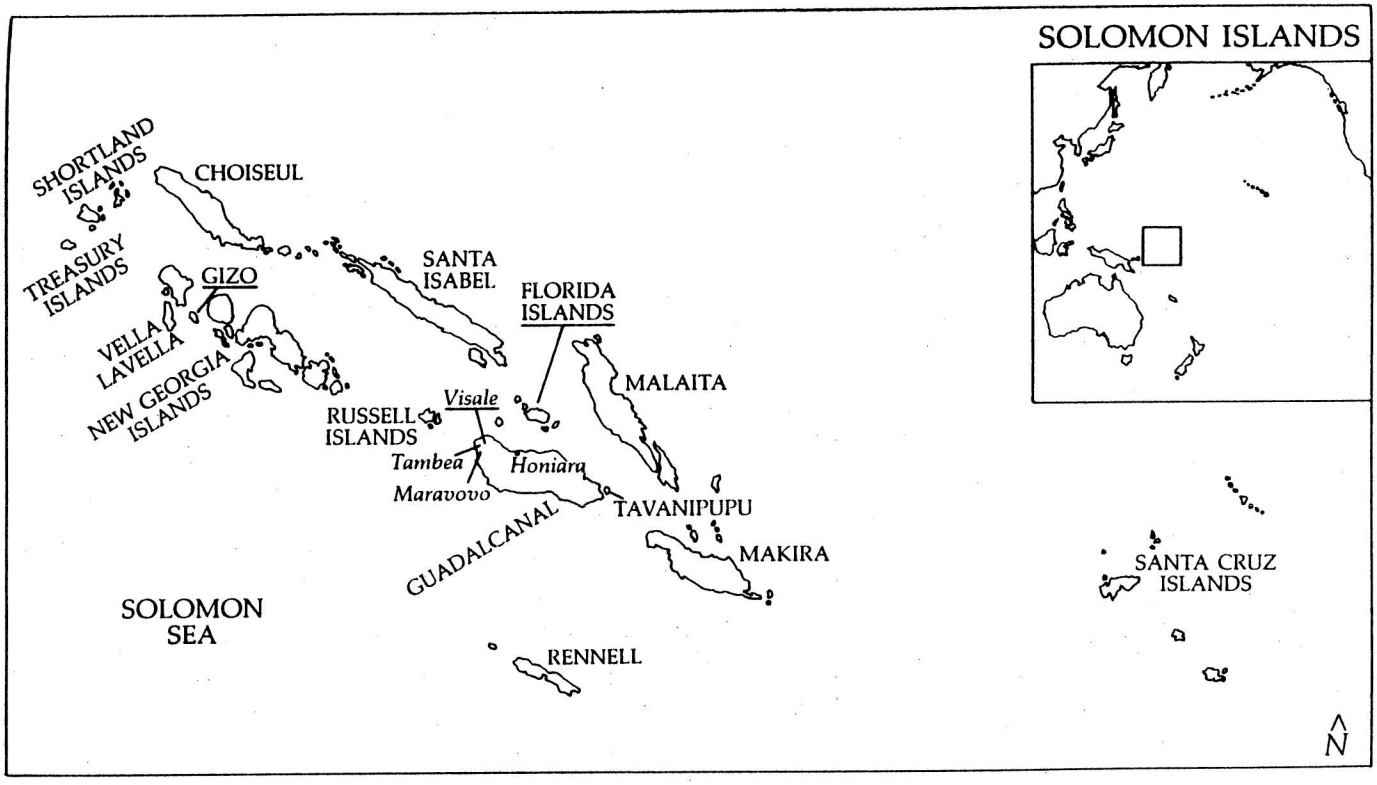

Fig. 1. Map of the Solomon Islands.

The Origin and Uses of Taro (*Colocasia esculenta*)

Taro, *Colocasia esculenta* (L.) Schott, is believed to have its origins in the Southeast Asia region and is one of its oldest cultivated crops (Pliny AD23-79 as quoted by Purseglove 1972). This crop is said to have spread to the Pacific area in prehistorical times. Purseglove also pointed out that the taxonomy has been confused and that the Pacific taro are the dasheen type and identified as *Colocasia esculenta* var. *esculenta* and those found in the West Indies area are identified as *Colocasia esculenta* var. *antiquaorum*. The taro grown throughout the Solomons is the dasheen type.

The young leaves, the petiole, and the inflorescence are widely used as vegetables. In traditional society, taro is used for many purposes, including medicine.

Colocasia esculenta is extensively grown in most islands, and in many of these islands it is the principal food. It is grown in a number of different types of agro-climatic conditions ranging from dryland cultivation to irrigated systems. Of these aroids, *Colocasia esculenta* is by far the most important, while others play a very important part as food reserves and in food security systems.

Colocasia esculenta on most islands is extensively grown on dryland, on some islands in irrigated systems, or on other islands both ways. In dryland cultivation, it grows better and gives the best yields when it is the first crop grown after tropical rain forest has been removed and is grown in areas where rainfall is 2,500 mm or more.

The cultivation of taro in the Solomon Islands, just like any other crop grown by the subsistence sector, is a complementary component of whole systems of food production and food security. Therefore, it has to be considered along with other root crops in any developmental work. A holistic approach towards all food production is more appropriate, and is the way in which farmers regard their food production system. In this day where markets can be found, this will also be beneficial to the household economy. The idea of looking at each crop in isolation does not reflect at all what the farmers' practices are in the subsistence sector nor in

areas where semi-commercial farming is taking place. Farmers treat all crops grown in their garden with equal care and importance. Every crop and variety grown have their niches in the social structure of the community, the environment, and the realities of the natural forces.

In the Solomons Islands, other types of aroids are also known as taro. These are *Xanthosoma, Alocasia, Amorpopalus, Crytosperma,* and *Colocasia*. These edible aroids are cultivated for food. Their importance just like other crops which are not sold but grown for home consumption are overlooked. As a result, not until recently have they received any attention from the formal sector. However, the work that is being carried out is given very little financial and technical support. This does not reflect the importance of this crop in the subsistence sector and its contribution to feeding the nation, nor does it reflect the household income-generating potential of this crop. Nevertheless, varieties have been selected by growers over the centuries, together with different methods of cultivating them. Some of the reasons for selection and maintenance are taste, cooking, aroma, medicine, varieties for babies, the young and the old, soil types, ceremonial purposes, diseases and pests, leaf eating quality, and the beauty of the gardens. As an integral part of the local culture, they are also important in medicine and ritual. Although their use as medicine may seem particularly interesting and laughable to the outsider, it should be noted that preparation for medicinal purposes is closely guarded by the traditional healers.

The Solomon Islands is one of the places of earliest taro cultivation. Over the ages, semi-permanent, environmentally-safe, and sustainable production systems developed. Although yields from these systems are low relative to those attained with the use of commercial fertilizer, they depend only on locally available resources. Risks are further lowered through the use of polycultures with a diversity of species and varieties.

For the islands where taro is the major crop, it was the main focus of technological development and sociological focus. Generally, taro prefers wet soil with good fertility and plenty of humus. However, taro is one crop that gives a good yield under marginal agro-climatic and soil conditions. Today, the crop is mostly grown under dryland cultivation. However, three categories of taro irrigation are evident in the major growing islands.

Taro Irrigation Systems of the Solomon Islands

The irrigation systems which were used and are still used in the major taro growing areas of the Solomons are briefly described as follows:

True Irrigation. In this system, flat terraces with an earth embankment are constructed with stones and upon their completion taro is planted. The planted area on the constructed terraces is an artificial pond through which water is kept constantly flowing. These types of terraced irrigated fields are found on Kolobangara and Guadalcanal. The terraces are still as they were when they were abandoned, and a pilot project is now being carried out to repair and revitalize these fields and bring them back to production.

Swampland Irrigated Systems. This is the least understood of the irrigated systems or terraced fields. Natural swampland or wet swampy habitats are terraced or drained to control the level of water within the ponds or fields; some large trees are left standing providing shade and mulch to the field. The trees and the leaves must act as a cooling system for the fields as there is no running water. These types of taro fields have been discovered in the New Georgia group, but a detailed study of the system has not been carried out. At present, very little work is under way; however, assistance is being sought to put these fields back into production.

Pit Cultivation. This type of cultivation is still in use on atolls today as it was centuries ago and will continue to be the system of taro cultivation in these atolls where land and water are two rare commodities. Pits are dug down to fresh water level, and the desired level of water saturation is maintained. In this system, both *Colocasia* and *Cyrtosperma* are cultivated.

These traditional intensive irrigated systems are particularly vulnerable to changes brought by contact with the outside world. These changes range from the introduction of new crops and increasing reliance on cash crops for money to buy food to the relocation of people and the introduction of new diseases which the growers do not know how to deal with. The removal of timber from the forest at a very fast pace has also brought about increased pest populations and the more rapid spread of traditional diseases. These have all been contributing factors to the decrease of taro cultivation and the neglect of the true irrigation and swampland methods of growing the crop.

Taro (*Colocasia esculenta*) Varieties

In the Solomon Islands, more than 200 accessions of *Colocasia* have been reported (Jackson and Pelomo 1980). Most of these accessions were from one island and are of the best varieties. To properly document how many varieties there are in the Solomon Islands, a complete

collection is still to be done. At a guess, the country probably has as many as 600 to 800 varieties of taro.

The cultivated types of *Colocasia esculenta* are recognized by the color of the corm flesh, maturity, taste, and their reaction to diseases that occur in the Solomon Islands. A range of corm flesh colors can be found, and the most common ones are as follows: white, creamy white, creamy yellow, pink, purple, orange, orange/white, purple/white, and purple/yellow.

Laminar color, vein color, and leaf shapes are also characters used to distinguish between different cultivars.

Taro is normally the first crop after virgin forest or the second crop after yams. The interval between the cutting of the virgin forest to the harvesting of yams to planting of the taro crop is eight months. The crop is traditionally grown in a pure stand and is not grown with sweet potato. Banana, yam, and sugarcane are sometimes planted in the present system, and sweet potato, too, is now being intercropped with taro.

Taro flowers from time to time but not all at the same time. This has been used to breed plants with resistance or some tolerance to several diseases of taro. Giberellic acid has also been used to induce flowering in several cultivars, enabling breeding work to be continued throughout the year.

Taro is propagated by leaf-bearing tops of the mature corms, side suckers, and tubers. To plant the crop, virgin forest is cleared and the rubbish is burned. The tops are planted by digging a hole in the ground with a sharp-pointed sizeable stick. After putting the planting material in, the holes are closed around the opening of the hole without compressing the soil. It is believed this facilitates the formation of big corms. The depth of the planting holes depend on the cultivar planted (i.e., if the plants form corms mostly above the ground or below), whether the farmer wishes to increase his planting material (in which case the hole will be very shallow), and whether the farmer is planting primarily to yield good quality corms (in which case the tops are planted deeply). The deeper the planting material is placed, the fewer suckers are produced. The spacing used is 60 to 90 cm. During the first three or four months of its growth, the crop is kept weed free and all the slow growing plants are removed and replanted again, leaving only the best plants in terms of growth to reach full maturity.

Harvesting occurs from five months to one year after planting. This follows the wide range of cultivars that are grown in the garden, which have different maturity periods. Plants are pulled out, corms are cut by a sharp sea shell implement, and the tops are stored for two to three days to one week before they are planted again. Suckers with corms which are not big enough for consumption are replanted without cleaning, and they are regarded as the best planting material. The suckers form the largest part of the planting material for the next crop. In traditional Solomon Islands' practice, the garden of taro is left in a relatively weedy condition as it approaches full maturity. This process is known as the maturing stage of the crop to ensure that the quality of the corm is good.

Decline of Taro Cultivation

The cultivation of taro (*Colocasia esculenta*) declined quite drastically in the Solomon Islands, being replaced by sweet potato; but in the last eight years farmers have been picking up this crop again as they encounter many problems with sweet potato pests and diseases. According to Gollifer (1970) and Jackson and Gollifer (1975), two factors contributed to the decline of taro cultivation, as follows:

Sweet Potato (*Ipomea batatas*). The introduction of sweet potato was the main reason for the decline of taro. Sweet potato is a crop which grows with relative ease on the coastal soils under intensive cropping as well as on land with reduced bush fallow. Short fallow periods have been brought about by population increases, pests, and diseases in sweet potato. Taro is the only crop which gives some yield even when grown in marginal soils (the social role that is attached to the crop). Rats and crabs are also a big problem with the growing of sweet potato in some areas. Although increased cropping on the same land is the major reason for the decline in taro cultivation, there is now a tendency for the farmers to return to their traditional taro crop and to restore some of the terraces that were abandoned after the Second World War.

Diseases. Jackson and Gollifer (1975) claimed that the outbreak of several devastating diseases and pests in recent years is a major contributing factor in the decline of taro growing. While this is true, one cannot ignore the fact that taro has always had these lethal diseases and people who grow them must have had ways of coping with them to enable them to continue to grow the crop right up to the time when Western civilization reached the Islands.

Traditional practices such as abandoning gardens that have diseases are no longer practiced, and the use of infected planting materials contributes to the spread of the diseases which consequently leads to the decline in the cultivation of this crop.

Socioeconomic factors have also played a role in the decline of taro. The social development just before World

War II but in particular the period after the war led to the mass movement of people on several islands from the more traditional scattered settlements in the bush to larger and permanent villages on the coastal plains.

The population expanded in these larger coastal villages, and it was no longer possible to produce enough taro and yam to feed the people. Under the shifting cultivation with short fallows that is practiced along the coast, labor inputs are intensive to give high enough yields to feed the people. Social development was and is still focused on these areas, and people prefer to remain there.

The diseases and problems associated with taro production have increased and are still increasing. Where the gardens are now larger, the incidence of diseases and pests increased. Also, because of population pressure on land, gardens are no longer protected by the dense stands of bush trees so the diseases and pests can move more rapidly between gardens them causing more damage and destruction. Traditional diseases and pests spread between islands, and new ones have been introduced. The best example is that of *Phytophthora colocasiae*, which first appeared in the Shortland Islands in 1946 and during the next twenty years or so spread throughout the Provinces due to the increased movement of produce and people.

Diseases and Pests

All the major diseases and pests of taro are present in the Solomon Islands. Some of these are extremely lethal to the continued cultivation of taro not only in the Solomon Islands but in the Pacific region as a whole. This could be particularly devastating for countries that have a very narrow genetic pool and rely on the crop for subsistence use and as an export crop.

The Research Section of the Ministry of Agriculture and Lands has been forced to realize the importance of the subsistence production and the fact that there are more disease and pest problems now than there were sixty years ago.

The research division has been involved in investigation of the root crops for the past 18 years to identify problems and to solve them in the context of the subsistence shifting agricultural systems of the country. Outside organizations such as the Food Agriculture Organization of the United Nations, the former Commonwealth Mycological Institute, Rothamsted Experiment Station of England, and the Department of Scientific and Industrial Research of New Zealand have provided help and other services most needed for this sort of investigation. The first priority in this area of work has always been to try and develop control measures that avoid the use of expensive pesticides and rely on providing the farmers with cultivars that have a higher level of tolerance to diseases and pests. Where no resistance cultivars are available, pesticides have been tested in the hope that they will become accepted by the farmers as their understanding and, hopefully, their income increases. For those diseases where neither resistant cultivar nor chemical controls are available, breeding resistant or tolerant varieties is being investigated.

The fungal diseases can be grouped into two categories--those that infect the leaves or the above-the-ground parts and those that infect the roots and the corms. The most damaging fungal disease of the leaves is caused by the fungus *Phytophthora colocasiae*. This disease was first reported in the Solomon Islands by Parham in 1947. It was suggested that this disease was introduced to the country from Indonesia via Papua New Guinea (Johnston 1960, Trujillo 1967). It is absent from some of the Solomon Islands such as Rennell and Bellona. This disease reduces yield by reducing the green photosynthetic surface area of the taro plant. The disease can be effectively controlled by fungicides such as zineb and copper oxychloride when applied at intervals of seven to 15 days (Jackson and Gollifer 1975).

Several species of *Pythium* have been frequently isolated from taros with symptoms of corm rot. The most damaging species according to work done in 1975 (Jackson and Gollifer) is *Pythium myriotyium,* which may cause decay in the corms, but in some cases there is no damage to corms at all even though this fungus was present.

In 1973, Gollifer and Brown reported for the first time that the fungus *Fusarium oxysporum* causes corm rot of taro in the Solomon Islands. The most commonly isolated fungus from the roots of infected taro is *Rhizotonia* spp. These two fungal diseases, although common, are not major diseases of taro.

There are three virus diseases of taro in the Solomon Islands. These are the most lethal diseases in the Solomon Islands on taro. Alomae and Bobone, described in James et al. (1973), have the potential to wipe out the taro culture if nothing is done about their spread within the region. This is particularly so in countries where cultivars grown are predominantly what would be grouped in the Solomon Islands as male taros. Several of the preferred cultivars held at the South Pacific Commission, including the 'Alafua Sunrise' produced from the breeding program at the University of the South Pacific Alafua in Western Samoa, have been screened and none have survived.

Symptoms suggestive of virus were first reported by Johnston (1960). In 1970, Zettler et al. in Florida described the virus and designated it the Dasheen Mosaic

Virus. This virus is the least important and has very little effect on the growth or yield of taro. It has been associated with a high amount of water in the corm and high quantity of calcium oxalate raphides.

Alomae causes some systemic necrosis which leads to the death of the plant. The young leaves fail to open properly and have a crinkled appearance. Bobone is a milder version of the Alomae virus, and the plants usually recover. Bacilliform virus particles of two sizes (330 x 0 mm and 12 x 30 mm) are associated with these diseases (Gollifer et al. 1978).

The planthopper *Tarophagus proserpina* (Kirk), (Homopthera, Delphacidae) is the vector of the Bobone virus (i.e., large particle). This insect feeds exclusively on taro. The small particle is said to be transmitted by the mealybug *Planoccoccus citri*. There is evidence that the *Tarophagus* may transmit both particles simultaneously (Jackson 1978). These two diseases severely reduce yield, and it is necessary to control the insects that transmit the two viruses--a very costly operation for farmers. Alomae and Bobone are also present in Papau New Guinea.

The root-knot nematode *Meloidogyne javanica* is recorded in taro but does not cause the same losses reported in Papua New Guinea, Fiji, and Niue (Bridge 1987), Trinidad, and in India. *Meloidogyne* has also been found on upland taro in Hawaii but was considered to be of no importance. Other plant parasitic nematodes found associated with taro are *Criconemidae* spp., *Longidorus siddiqi, Rotylechus* spp., *Helicotylenchus* spp., and *Xiphinema insigne.*

In 1981 an undescribed species of the nematode *Hirschmanniella* was found in corms of taro with severe reddening of the internal corm flesh tissue (Mortimer et al., 1981). This nematode has been reported as making the corms inedible and was found associated with the disease of taro known locally as *mitimiti.*

Hirschmanniella miticausa is an endoparasitic nematode and was first recorded in taro in the Solomon Islands where it was found associated with a very serious corm rot of taro (Mortimer et al. 1981). The roots and the corms were attacked and the plants stunted. The invaded corms were inedible. The disease is particularly severe in swamp pits of Ontong Java where the disease is said to have been introduced in recent years. The Islanders have completely abandoned the growing of their traditional variety and are now growing a variety known as 'Tiko'. In 1983, *Hirschmanniella miticausa* was also reported from Papua New Guinea.

In the Solomon Islands, the disease is present only in the islands of Choiseul, Vella Lavella, Shortland, Ontong Java, and Malaita. These are taro-growing islands and the crop is their main staple.

Apart from the pests that transmit the viruses, the most damaging insect pest of taro in the Solomon Islands is the Taro Beetle. This beetle tunnels the corms and leaves very little for human consumption. It also reduces the market value of the crop. Four species occur in the Solomon Islands. They are *Papuana uninodis, P. woodlarkiana, P.huebneri*, and *P. inermis.*

Control of Disease and Pests of Root Crops

There are six main categories of control methods which have been used in various combinations in the Solomon Islands. These include exclusion, eradication, protection, selection of disease-resistant varieties, breeding varieties with resistance, and certification scheme.

The business of exclusion is the work that is being carried out by the Quarantine Division, and it is the job of the Quarantine Division to prevent the introduction of plant materials which may be potential carriers of exotic pests and diseases. In this way, pests and diseases which may spread through spread of planting material are avoided. Quarantine legislation has also been used to control the movement of untreated planting material within the Solomon Islands. In countries such as the Solomon Islands where small islands are separated by large stretches of sea, isolation is possible, resulting in some islands being free of certain diseases.

Some diseases can be eradicated if an intensive program is carried out in certain islands. Examples of these in the Solomon Islands include Witches Broom Disease of sweet potato caused by mycoplasma-like organisms and Cassava Green Mosaic Virus. This method has been used for the eradication of diseases in single gardens even though the disease is present elsewhere in the area. This method of control has been practiced by the Melanesian people for generations and was a very effective and important method to keep in check Alomae and Bobone in Choiseul and Malaita. All tools used in a garden infected by the disease are never used again, and the planting material is not used for replanting elsewhere. Traditionally, Alomae and Bobone were controlled by roguing, but this method is said to be no longer effective because gardens are no longer isolated as they were before.

Protection involves the killing of the causal agent with pesticides before it can invade the plants, but these methods are new and not appropriate to the farmer who has very little knowledge of pesticides and who is unable to afford them. It is very unlikely that the farmer will use these expensive pesticides as the root crops he grows are mostly for his own use.

Just as cultivars differ in their appearance, yield, and quality of their edible corms, they also differ in their reaction to diseases from island to island and within an island. This can be exploited to control the diseases and pests in breeding programs. Where resistant plants are not available, the best that can be done for the farmers is to provide them with disease-free high yielding varieties.

Work is continuing in the breeding of resistant varieties to try and control the leaf blight, Alomae and Bobone virus diseases, and the nematode disease *mitimiti* of taro.

References Cited

Bridge, J. 1987. An overview of plant-parasitic nematode problems in the Pacific Islands. 26th Meeting of Society of Nematologists, Honolulu, HI, July 19-22, 1987. J. of Nematology, Vol. 19. pp. 515.

Gollifer, D. E. 1970. Preliminary observations of the performance of cultivars of taro (*Colocasia esculenta*) in the British Solomon Islands with notes on the incidence of taro leaf blight and other diseases. pp. 56-60. *In* Proceedings, 2nd International Symposium on Tropical Root and Tuber Crops, Vol. 2, Sec. 5.

Gollifer, D. E. & J. F. Brown. 1973. Corm rot of *Colocasis esculenta* caused by *Fusarium oxysporum.* Plant Disease Reporter 57(8): 701-703.

Gollifer, D. E. & G. V. H. Jackson, A. J. Dabek & R. T. Plumb. 1978. Incidence and effects on yield of virus diseases of taro (*Colocasia esculenta*) in Solomon Islands. Annals of Applied Biology 88, No. 1. pp. 131-135.

Jackson, G. V. H. 1978. Alomae and Bobone Diseases of Taro. Advisory Leaflet No. 8. South Pacific Commission, Noumea, New Caledonia.

Jackson, G. V. H. & D. E. Gollifer. 1975. Disease and pest problems of Taro (*Colocasia esculenta* (L.) Schott) in British Solomon Islands. PANS 21: 45-53.

Jackson, G. V. H. & P. M. Pelomo. 1980. Breeding for resistance to diseases of taro, *Colocasia esculenta,* in Solomon Islands. pp. 287-298. *In* International Symposium on Taro and Cocoyam. Sept. 1979, Baybay, Philippines.

James, Mari, R. T. Kenton & R. D. Woods. 1973. Virus-like particles associated with two diseases of *Colocasia esculenta* (L.) Schott in the Solomon Islands. J. Gen. Virology 21: 145-153.

Johnson, A. 1960. A Preliminary Plant Disease Survey in the British Solomon Islands Protectorate. Rome, FAO. 1960.

Mortimer, J. J., J. Bridge & G. V. H. Jackson. 1981. *Hirschmanniella* sp., an endoparasitic nematode associated with mitimiti disease of taro, *Colocasia esculenta*, corms in Solomon Islands. FAO Plant Protection Bulletin 29(1/2): 9-11.

Parham, B. E. V. 1947. Economic botany notes 3: Disease of taro. Agricultural J. (Fiji), Vol 18(3):77-80.

Purseglove, J. W. 1972. Tropical Crops-Monocotyledons. Longmans, London.

Trujillo, E. E. 1967. Diseases of the genus *Colocasia* in the Pacific area and their control. pp. 13-19. *In* Proceedings of International Symposium on Tropical Root and Tuber Crops, Vol. 2.

Zettler, F. W., M. J. Foxe & R. D. Hartman. 1970. A mosaic disease of dasheen caused by filamentous virus. Phytopathology, Vol. 60(11):1543.

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Jane C. Muench, an independent editor with J.C.M. Office Services, provided technical support.

Publication was supported in part by a grant from the USDA/CSRA Sustainable Agriculture Research and Education Program (formerly called L.I.S.A.). Additional support was provided by American Samoa Community College, College of Micronesia, Northern Marianas College, University of Guam, Yap Institute of Natural Science, and the University of Hawai'i under the Agricultural Development in the American Pacific (ADAP) Project.

The Library of Congress has catalogued this serial publication as follows:

Research extension series / Hawaii Institute of Tropical Agriculture and Human Resources.—001—[Honolulu, Hawaii]: The Institute, [1980–
v. : ill. ; 22 cm.
Irregular.
Title from cover.
Separately catalogued and classified in LC before and including no. 044.
ISSN 0271-9916 = Research extension series - Hawaii Institute of Tropical Agriculture and Human Resources.
1. Agriculture—Hawaii—Collected works. 2. Agriculture—Research—Hawaii—Collected works. I. Hawaii Institute of Tropical Agriculture and Human Resources. II. Title: Research extension series - Hawaii Institute of Tropical Agriculture and Human Resources.
S52.5R47 630'.5—dc19 85-645281
AACR 2 MARC-S
Library of Congress [8506]